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[54] **EXTENSIBLE SAFETY APPLIANCE FOR
 MANHOLE LADDERS**
8 Claims, 4 Drawing Figs.

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 E06c 7/18
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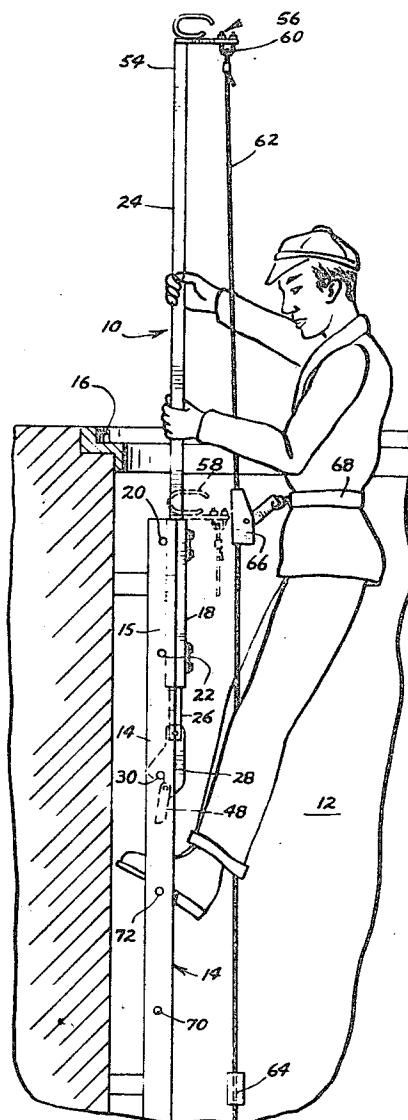
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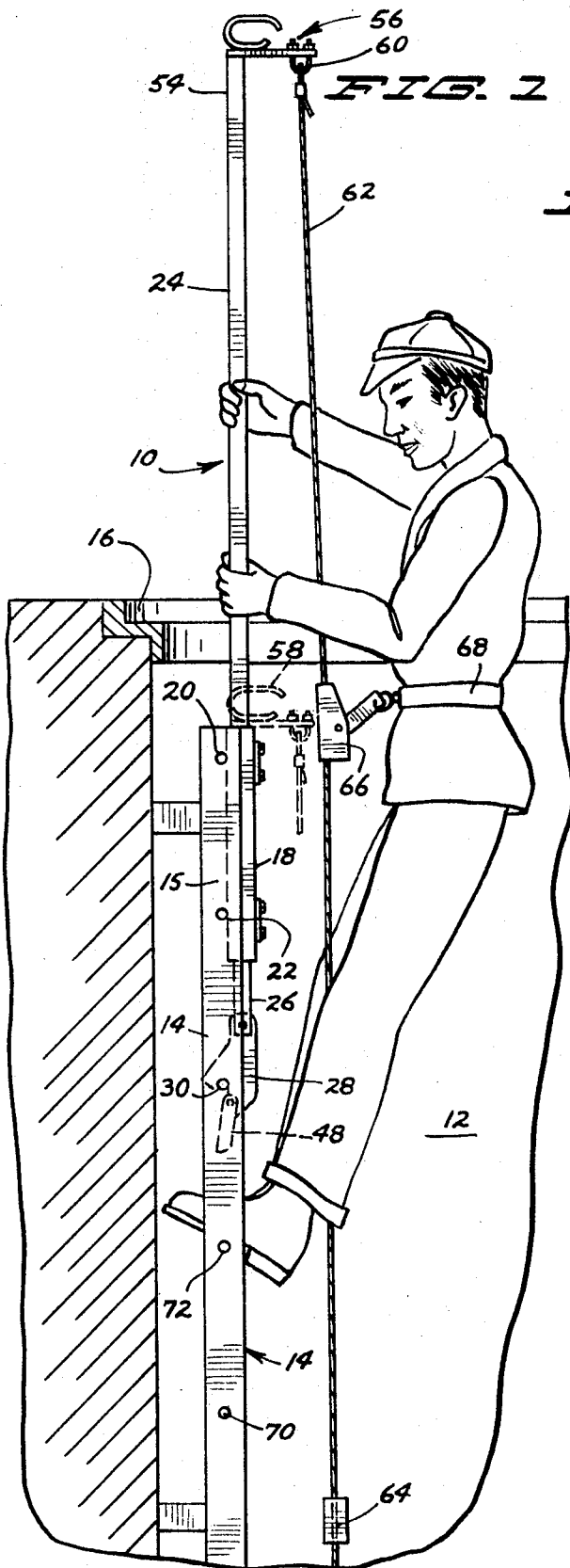
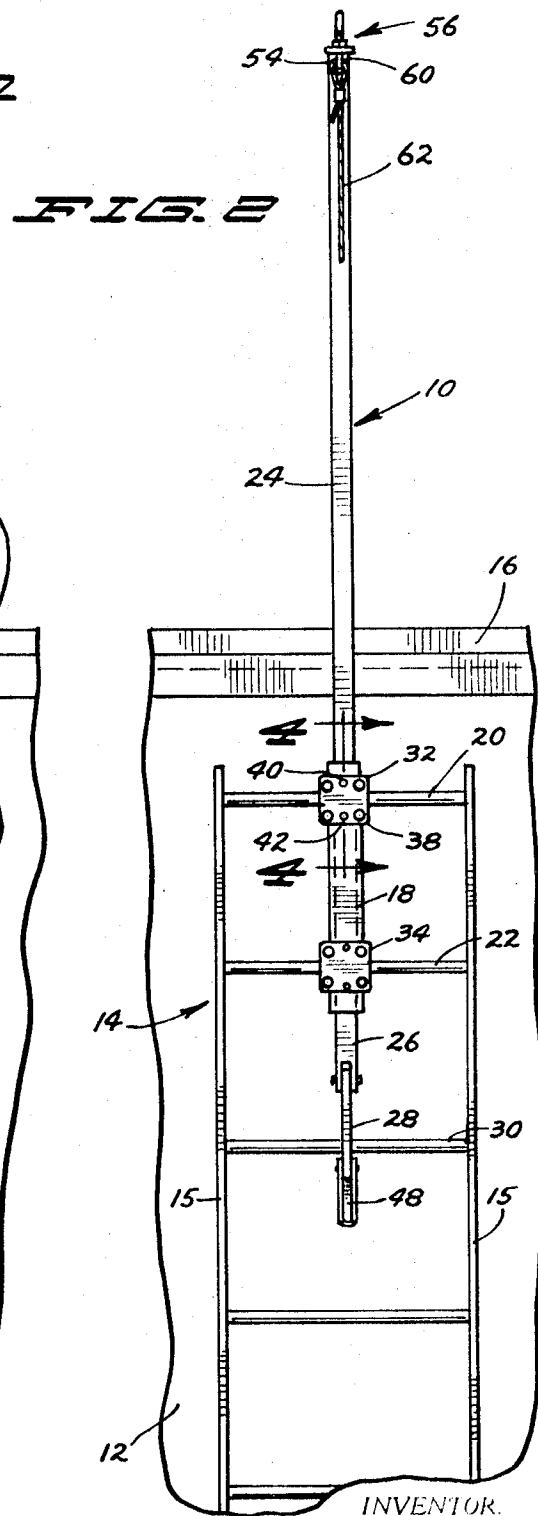
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ABSTRACT: A sleeve attached to the rungs of a manhole ladder has a slidable rod therein which is extendable upward from the manhole to provide a vertical railing for workman on the ladder. A support at the lower end of the rod releasably engages a ladder rung to retain the rod in extended position; when unneeded the rod can be stored wholly within the manhole.

The purpose of the foregoing abstract is to enable the Patent Office and the public generally, and especially the scientists, engineers, or practitioners in the art who are not familiar with patent or legal terms of phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by claims, nor is it intended to be limiting as to the scope of the invention in any way.





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FIG. 3

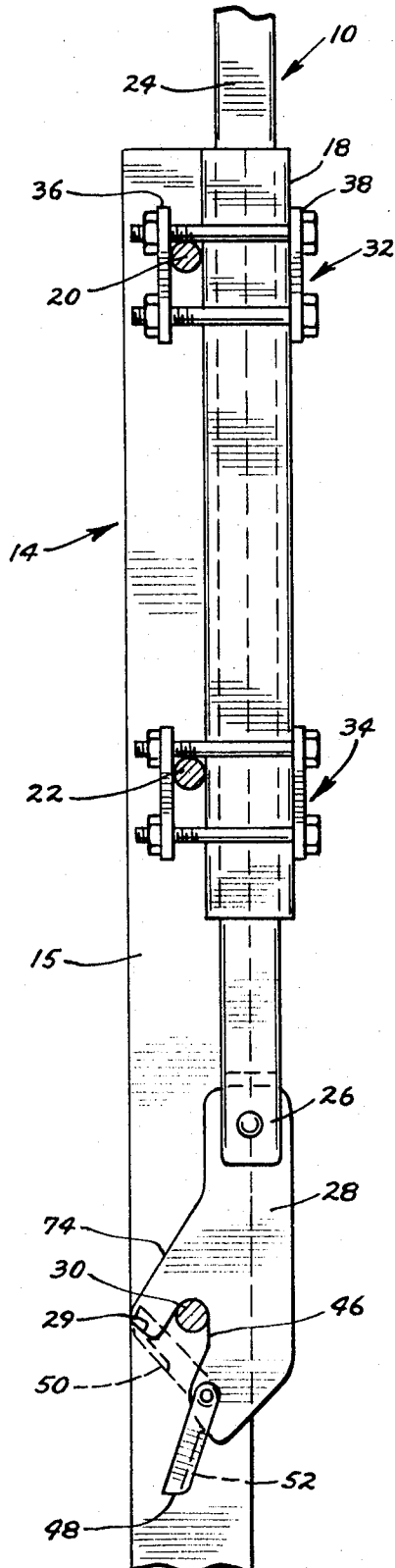
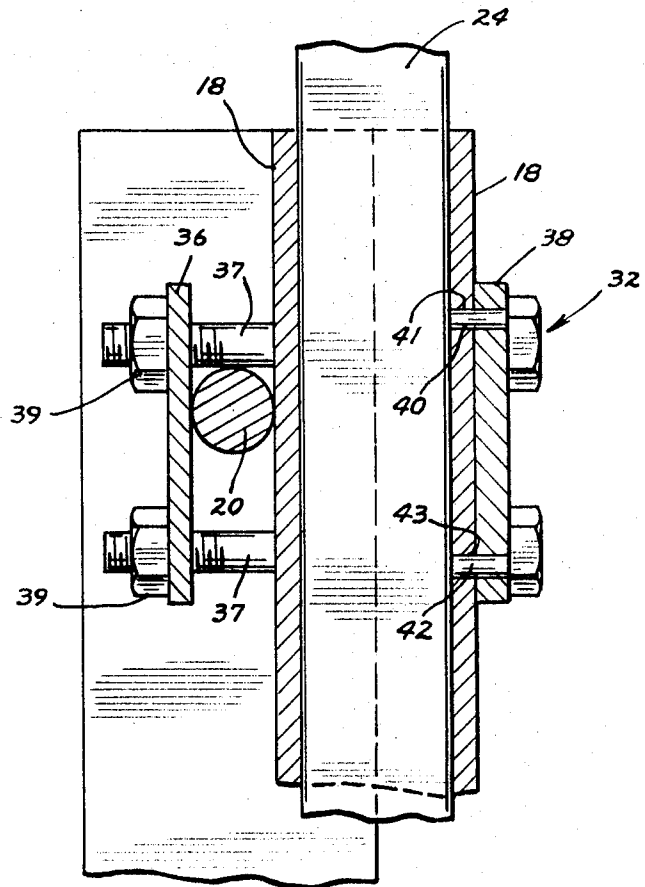


FIG. 4

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EXTENSIBLE SAFETY APPLIANCE FOR MANHOLE LADDERS

BACKGROUND OF THE INVENTION

Entering or leaving a manhole of the type commonly used on city streets has frequently been a source of injury to workmen. Such manholes usually have a fixed ladder beginning near ground level but rarely have any handgrip or guard rail which a descending workman can grasp before beginning his descent into the manhole. A workman had to cling to the manhole rim while inserting his legs into the manhole, and he could not conveniently grasp the ladder until his legs and lower torso were completely within the hole. If in the meantime his feet slipped from the often damp and slippery ladder rungs, he could sustain a severe fall. The combination of slippery rungs and absence of reliable handholds near the rim of the manhole made both entering or leaving the manhole treacherous. My invention solves these problems with an extensible vertical railing which can be stored wholly in the manhole when unneeded and pulled to an upright position extending from the hole to provide a convenient handhold for workmen.

SUMMARY OF THE INVENTION

My invention comprises a reliable, but inexpensive, self-storing safety appliance for a manhole ladder. A rigid sleeve attached to the rungs of a manhole ladder has a slidable rod therein which can be extended out of the manhole to provide a vertical railing for a workman when entering or leaving the manhole. A safety cable hung from the upper end of the rod can be attached to a workman's safety belt providing the workman with constant protection while on the ladder. When the rod is unneeded, it can be stored wholly within the manhole.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a manhole ladder with my safety appliance invention attached to the ladder rungs.

FIG. 2 is a front view of the ladder of FIG. 1 showing the detailed construction and mounting of the invention.

FIG. 3 is a side view of the safety appliance of FIG. 2 further illustrating its mounting on the ladder rungs.

FIG. 4 is a sectional view of a bracket holding my safety appliance to the ladder rung taken along cutting plane 4-4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows my manhole ladder safety appliance 10 being used by a workman entering a manhole 12 which has a fixed ladder 14 commencing below the rim 16. A rigid sleeve 18, attached to rungs 20 and 22 of ladder 14 by any known fastening means, has a rigid rod 24 which slides in the sleeve 18 permitting the rod 24 to be pulled upward in the sleeve to form a vertical railing extending out of the manhole. The lower end 26 of the rod 24 is bifurcated with a support 28 swingably mounted between the bifurcations; the support 28 is shown resting on a rung 30 of the ladder. The sleeve 18 is shown attached to ladder 14 by mounting brackets 32 and 34 (FIG. 3).

Mounting bracket 32 has a pair of plates 36 and 38 interconnected by two pairs of bolts 37 and nuts 39 (FIG. 4) which rigidly secure the plates 36 and 38 against the rung 20 and sleeve 18, respectively. A pair of pins 40 and 42 extending through plate 38 mate with cooperating apertures 41 and 43 in the sleeve 18 to prevent the sleeve from slipping from bracket 32. The mounting bracket 34 is identical to bracket 32.

Referring now to FIG. 3, the support 28 has a downwardly opening notch 46 designed to receive a ladder rung 30 thus supporting the rod in an upright, extending position. A closure 48 is swingably mounted to the support 28 for movement between open and closed positions and provides a means on the support for alternately opening and obstructing the notch

46. The open position of the closure is indicated at 48, and the closed position by dashed lines at 50. Closure 48 has a bridge 52 which contacts support 28 when in open position and keeps the closure in the shown pendant open position to assure contact between it and a ladder rung when the rod and support are lowered as will be explained hereafter. The bridge rests against support 28 at 29 when the closure is in a closed position.

The upper end 54 of the rod 24 (FIGS. 1 and 2) may be provided with a handle assembly 56 accessible to a workman outside the manhole to pull the rod 24 upward out of the manhole to provide a vertical railing. When the rod is stored in the manhole the handle assembly 56 is wholly within the manhole, resting on the upper end of the sleeve as indicated by dashed lines at 58.

The handle assembly 56 has a U-clamp 60 to which a safety cable 62 bearing a weight 64, is attached for suspension into the manhole. A cable-gripping clamp 66 slides on the cable 62 and can be attached to a workman's safety belt to provide additional protection when on the ladder. The clamp 66 is constructed to slide freely on the cable 62 unless a heavy downward load is applied to the clamp. The weight of a falling workman causes the clamp 66 to lock onto cable 62 to halt the fall. It should be understood that my invention is completely operational without safety cable 62 or handle assembly 56, and that these items are helpful but not essential.

If desired my safety appliance can be fabricated without support 28 and closure 48. These elements can be replaced by any supporting means which will retain the rod 24 in an extended position; for example, the rod can be provided with a notch at its lower end. The notched lower end can receive a rung therein and thus serve as a means for supporting the rod. The sleeve and rod can be fabricated with sufficient play therebetween to permit the notched rod to be disengaged from the rung and slid downward in the sleeve to rest wholly within the manhole.

In operation, a workman reaches into manhole 12, grasps handle assembly 56, and pulls it upward to raise rod 24 to the upright extending position of FIG. 1. Raising rod 24 causes support 28 to contact successive rungs 70, 72, and 30 at angled guide surface 74 (FIGS. 1, 3) causing the support 28 to swing away from the ladder 14 and enabling the support to move freely upward. When the rod is upright the support 28 reaches a position where the rung 30 on which it is desired to have the notch 46 rest is below the notch but above the closure 48. The rod and support are then lowered sufficiently to engage rung 30 in notch 46. The support 28, rod 24, and sleeve 18, cooperate to form a vertical railing supported by ladder 14.

The workman can now grasp rod 24 with one or both hands and safely lower his legs and torso into the manhole with little risk of a disastrous fall. After the workman is wholly within the manhole, he can grasp the side rails 15 of ladder 14. In like manner, the rod provides protection for a workman ascending the manhole ladder. If desired, the workman may attach his safety belt 68 to the clamp 66 of the safety cable for additional protection.

When the safety appliance is no longer needed and the manhole is to be closed, rod 24 is raised sufficiently to disengage notch 46 from rung 30 and bring closure 48 to a position above the rung 30. The rod can now be lowered without the support 28 engaging any rungs. As support 28 approaches a rung, pendant closure 48 in its open position contacts the rung and the closure 48 is pushed to a closed position 50 obstructing notch 46. The closure and support slide along the rung causing support 28 to swing away from the rung. As notch 46 slides downward past the rung the closure 48 swings downward to a pendant open position and is ready to encounter the next rung thus permitting a workman to easily lower and store my safety appliance 10 completely within the manhole.

While I have described a preferred embodiment of the present invention, it should be understood that various

changes, adaptations and modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. An extensible safety appliance for attachment to the rungs of a manhole ladder comprising:
 - a rigid sleeve attached to the ladder;
 - a rigid rod slidable in the sleeve, the upper end of the rod being accessible to an operator outside the manhole so the operator can pull the rod upward out of the manhole so as to form a vertical railing to grasp when on the ladder and so the rod can be slid downward in the manhole when unneeded;
 - a support swingably mounted to the lower end of the rod, the support including a downwardly opening notch to receive a ladder rung therein thus supporting the rod; and means on the support alternately obstructing and opening the notch to permit lowering of the rod past successive ladder rungs by an operator outside the manhole.
2. The combination according to claim 1 wherein a handle assembly is formed at the upper end of the rod so the rod is readily accessible to an operator outside the manhole, the handle assembly resting on the upper end of the sleeve and wholly within the manhole when said rod is stored in the manhole.
3. The combination according to claim 2 wherein a safety cable is attached to said handle assembly and a cable-gripping clamp attachable to a safety belt is carried on the cable.
4. The combination according to claim 1 wherein said means on the support alternately obstructing and opening the notch includes a closure swingably mounted to the support to obstruct the notch when in a closed position and to swing clear of the notch when in an open position.
5. The combination according to claim 4 wherein:
 - the closure is arranged on the support such that the closure when in open position contacts successive rungs of the ladder as the support is lowered and each contacting rung moves the closure to a closed position thus permitting the rod and support to be lowered wholly into the manhole for storage without the support engaging a rung.
6. An extensible safety appliance for attachment to the rungs of a manhole ladder comprising:

- a rigid sleeve attached to the ladder;
- a rigid rod slideable in said sleeve, the upper end of said rod being accessible to an operator outside the manhole so the operator can pull the rod upward out of the manhole so as to form a vertical railing to grasp when on the ladder and so the rod can be slid downward wholly within the manhole when unneeded;
- a support swingably mounted to the lower end of the rod, the support including a downwardly opening notch and the support having a closure swingably mounted thereto to obstruct the notch when in a closed position and to swing clear of the notch when in an open position;
- the notch of the support engageable with a ladder rung by pulling the rod and support upward until the notch is above and the closure below a given rung and then lowering the notch into engagement with the given rung thus retaining the rod and support in an upright extending position on the ladder to form a vertical railing by cooperation between support, rod, and sleeve;
- the support disengageable from the given rung by pulling the rod upward sufficiently to raise the closure above the rung; and
- the closure arranged on the support such that the closure when in open position contacts successive rungs of the ladder as the support is lowered and each contacting rung moves the closure to a closed position thus permitting the rod and support to be lowered wholly into the manhole for storage without the support engaging a rung.
7. An extensible safety appliance for attachment to the rungs of a manhole ladder comprising:
 - a rigid sleeve attached to the ladder;
 - a rigid rod slidable in the sleeve, the upper end of the rod being accessible to an operator outside the manhole so the operator can pull the rod upward out of the manhole so as to form a vertical railing to grasp when on the ladder and so the rod can be slid downward in the sleeve to rest wholly within the manhole when unneeded; and means at the lower end of the rod for supporting the rod on a ladder rung.
8. The combination according to claim 7 wherein the supporting means is a downwardly opening notch in the lower end of the rod constructed to releasably receive the rung.